75th MORSS CD Cover Page

712CD

UNCLASSIFIED DISCLOSURE FORM CD Presentation

12-14 June 2007, at US Naval Academy, Annapolis, MD

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Original title on 712 A/B:__Command and Control for Homeland Security_____
_____

Revised title:_____

Presented in (input and Bold one): (WG_02__, CG___, Special Session ___, Poster, Demo, or Tutorial):

This presentation is believed to be:
## UNCLASSIFIED AND APPROVED FOR PUBLIC RELEASE

1. REPORT DATE **01 JUN 2007**	2. REPORT TYPE **N/A**	3. DATES COVERED **-**	
4. TITLE AND SUBTITLE **Command and Control for Homeland Security**		5a. CONTRACT NUMBER	
		5b. GRANT NUMBER	
		5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)		5d. PROJECT NUMBER	
		5e. TASK NUMBER	
		5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **SAIC/ONR 875 North Randolph St., Arlinmgton, VA 22203-1995**		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSOR/MONITOR'S ACRONYM(S)	
		11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT **Approved for public release, distribution unlimited**			
13. SUPPLEMENTARY NOTES **See also ADM202526. Military Operations Research Society Symposium (75th) Held in Annapolis, Maryland on June 12-14, 2007., The original document contains color images.**			
14. ABSTRACT			
15. SUBJECT TERMS			

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT **UU**	18. NUMBER OF PAGES **23**	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**			

Command and Control for Homeland Security

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SAIC/ONR
6/14/07
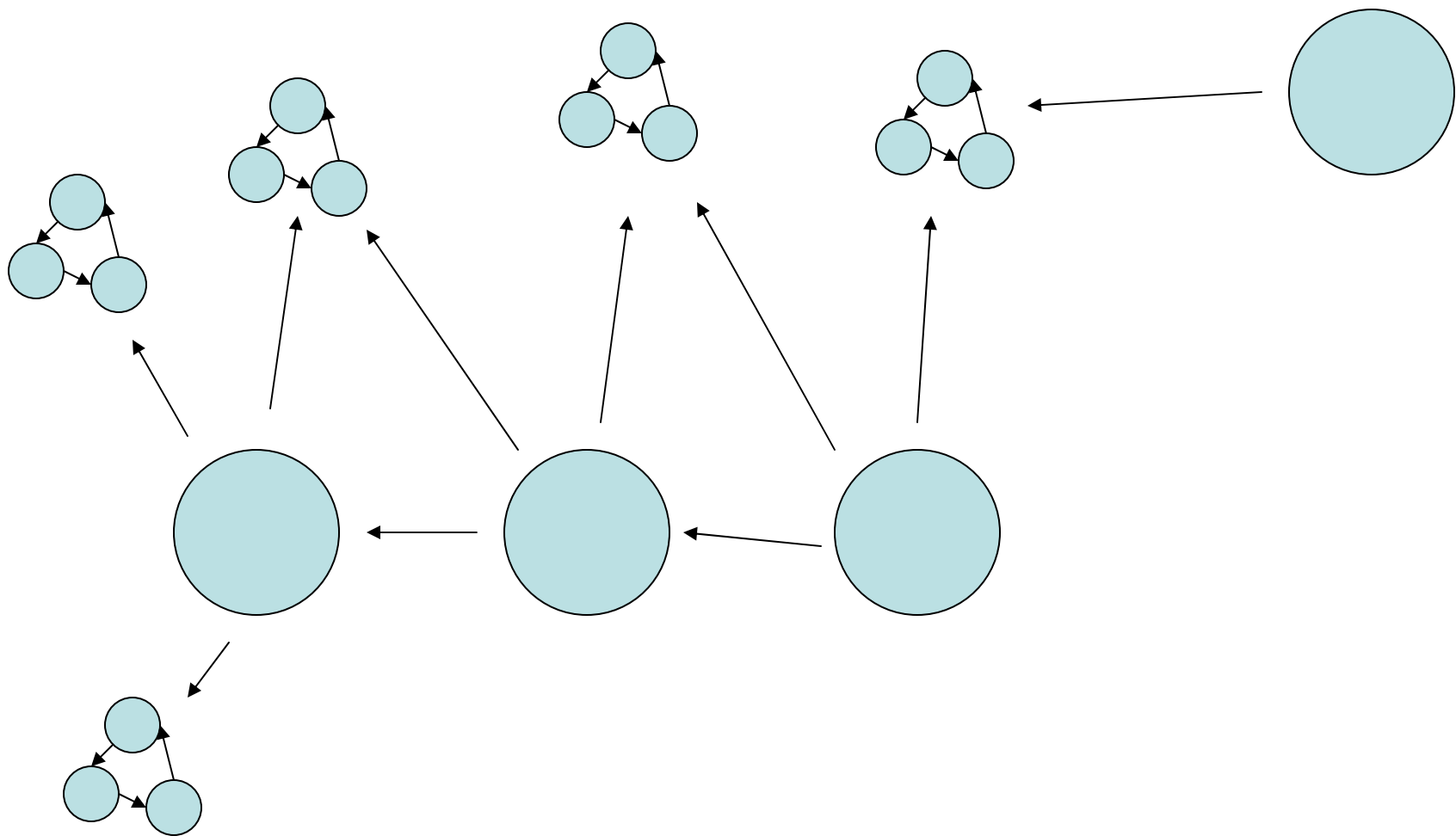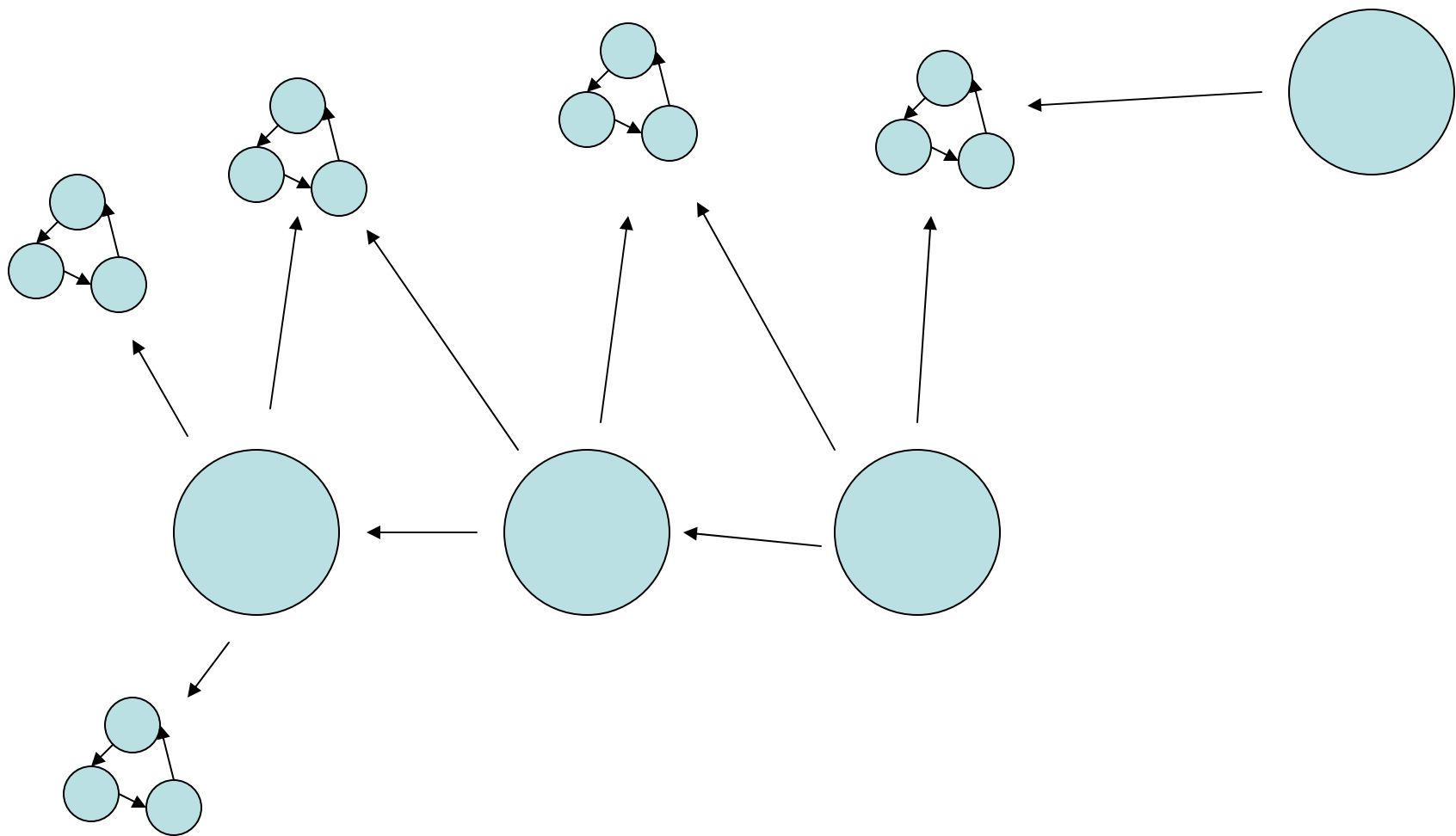
A reference-connected set of ProMED-mail postings representing tsunami-related disease outbreaks

ProMED-mail

- Internet-based system dedicated to rapid global dissemination of information on outbreaks of infectious diseases
  - Acute exposures to toxins (human, plant, animal)
  - 30,000+ subscribers (military, civilian)
  - 150 countries, and expanding
  - Open to all sources
  - Free of political constraints
- A major source of expertise
  - Official program of International Society of Infectious Diseases
  - E-mail services provided by Harvard School of Public Health
  - Users include WHO, UN, Red Cross, CDC ….
  - Largest reporting base of any health organization

First disease outbreaks reported
- ----------------------------------
The first outbreaks of communicable diseases were now being seen in areas hit
by last Sunday's (26 Dec 2004) killer waves in Asia, a senior WHO official
said today, 2 Jan 2005.

"There are increasing reports of diarrheal disease outbreaks coming from
displaced persons' settlements in Sri Lanka, in India," said David Nabarro,
the top official at the WHO dealing with humanitarian crises.

However he said the initial signs were not cause for alarm, although
preventive measures and treatments must continue. "They are not causing us
alarm because we expect this," he said.

"What we need to do is to make sure that we continue to distribute all
rehydration salts and treatment for diarrhea and we continue to do our work in
sanitation and water supplies."

The death toll from the catastrophe has now edged towards 126 000.

- ---

ProMED-mail
<promed@promedmail.org>

[This is likely the first of many reports regarding infectious
diseases emerging in the wake of the disastrous tsunamis. Although
much will be contaminated water-associated enteric disease including
cholera and typhoid, mosquito-transmitted diseases such as malaria,
and non-enteric water-linked diseases such as melioidosis and
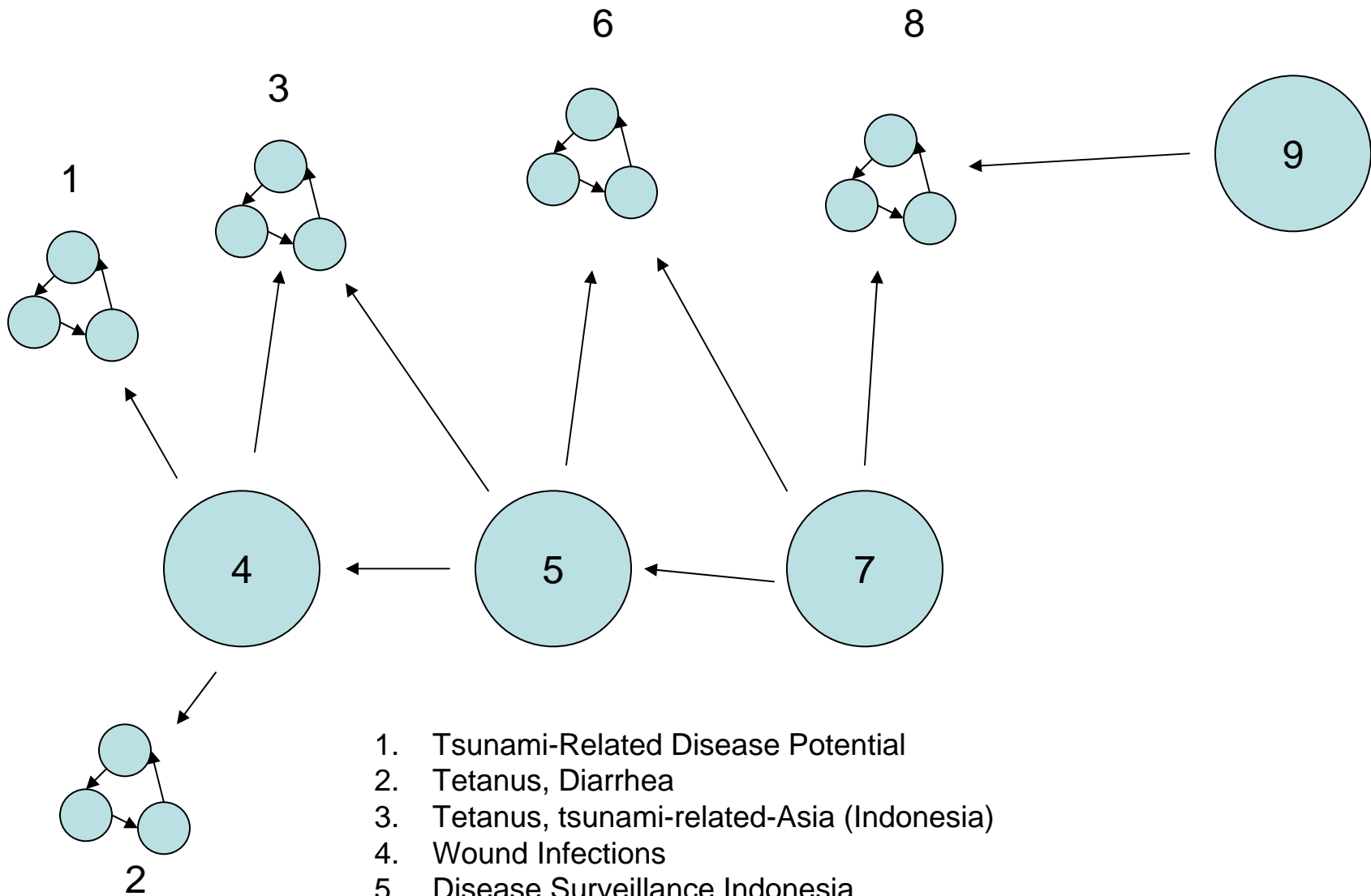leptospirosis will also occur. - Mod.LL]

[see also:
Tsunami-related disease potential - Asia (04) 20041231.3453
Tsunami-related disease potential - Asia (03) 20041229.3436
Tsunami-related disease potential - Asia (02) 20041229.3432
Tsunami-related disease potential - Asia 20041227.3422]
..........................ll/lm

- ----------------------------

1. Tsunami-Related Disease Potential
2. Tetanus, Diarrhea
3. Tetanus, tsunami-related-Asia (Indonesia)
4. Wound Infections
5. Disease Surveillance Indonesia
6. Cholera, tsunami-related - Indonesia
7. Melioidosis Thailand
8. Melioidosis Australia
9. Melioidosis Australia, Finland

The Strategic Vision

- In ProMED-mail, messages can be associated with each other through their references.
- "Reference-connected sets" can be constructed that identify subject categories as they evolve IN REAL TIME.
- The challenge: Can the capabilities of ProMED-mail be enhanced by available technology?
  - User-friendly graphic interfaces
  - Automated extraction and formatting of data
  - Expert systems for epidemiologic analysis
  - Powerful algorithms for data and information fusion
  - Interconnected with other networks
  - Standard forms through an internet

The Detection of Emerging Infections Using An Epidemiologic Surveillance System
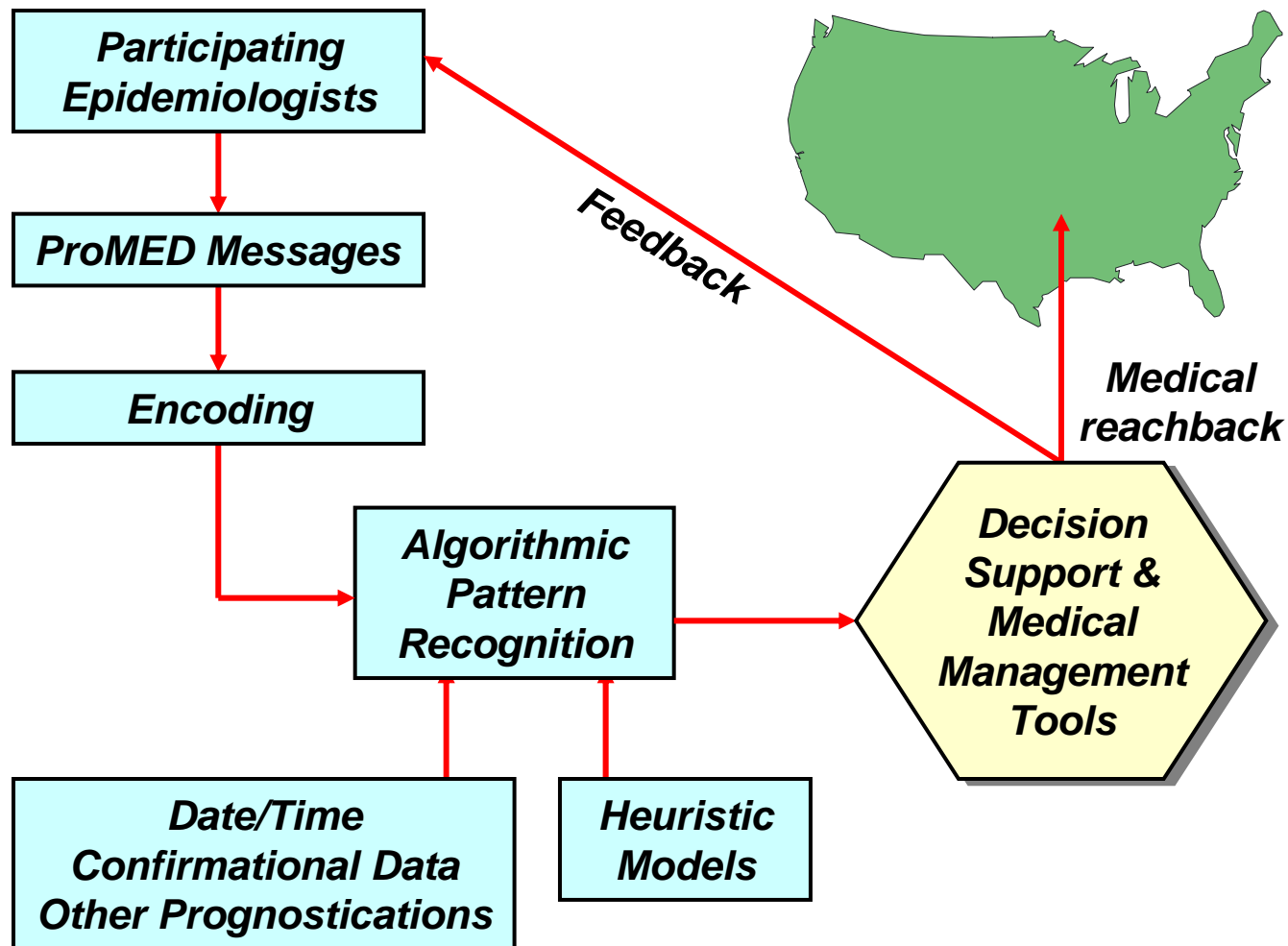
DHS Secretary established NIMS March 2004

"NIMS designates…unified incident management structures…for use by all responders…to respond to natural disasters or emergencies, including acts of terrorism…."

"States coordinate their response through state coordinating officers (SCOs) and their emergency operations centers (EOCs)."

INFORMS MAS Conference on Homeland Security
June 2006

- Most disasters should be treated as local.
- Taking the step from local control to higher levels is too difficult (cultural differences, personnel turnover).
- If DoD is brought in to help, the greatest need is to determine the optimum command and control construct with doctrinal lines of communication.

NIMS Revision Version 2 March 2007

- "for complex incidents with national implications (such as an emerging infectious disease or a bioterrorist attack) the ICS provides a flexible core mechanism for coordinated and collaborative incident management."

- "Incidents that are not site specific, are geographically dispersed, or evolve over longer periods of time will require extraordinary coordination among all participants, including Federal, State, tribal, local, private sector, and NGOs"

- "The incident command organizational structure develops in a top down modular fashion …."

NWDC Domestic Disaster Relief Operations Planning, 15 May 2006

"Effective communications are essential to coordination….Determine the primary C2 medium. Consider using unclassified e-mail to facilitate participation by all agencies."

AFRL-Supported Studies on Large-Scale Coordination

- Information flows break down with > 3 decision-makers
- Some organizations are not accustomed to working together
- Command: A clear command structure is needed
- Control: More vertical integration is needed

A Sociotechnical Systems Analysis of the Toronto SARS Outbreak

"A lack of vertical integration…explains why SARS was widely transmitted."

Vertical Integration

Decisions made at the higher levels of the hierarchy need to be disseminated to the lowest levels of the hierarchy, and information about what is happening at the lower levels of the hierarchy needs to circulate to the highest levels, creating feedback loops.
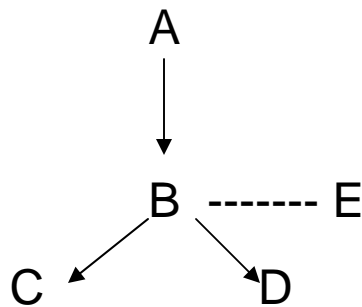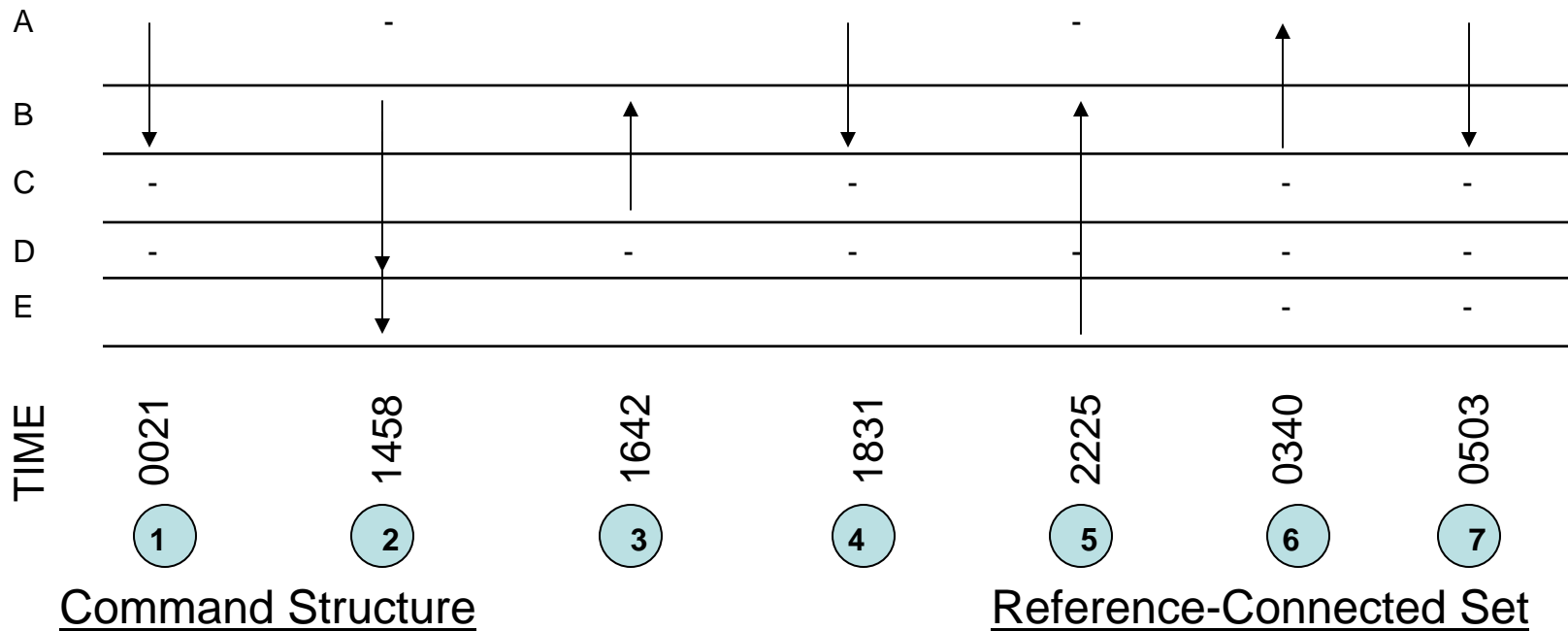
These feedback loops allow decisions made at the higher levels of the system to reflect the goals and capabilities of the lower levels.

HOW DO WE RECONCILE THE REQUIREMENT FOR A "CLEAR COMMAND STRUCTURE" WITH THE REQUIREMENT FOR "VERTICAL INTEGRATION"?
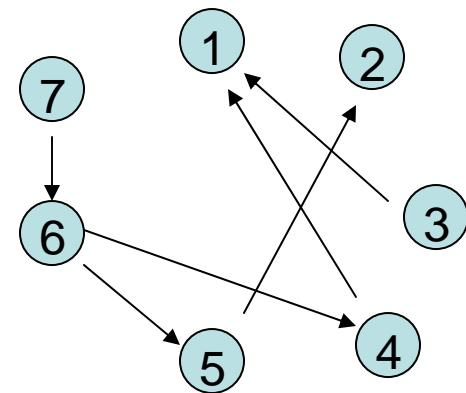
Vertical Integration in a Military Command Hierarchy

A

B

C

(1) ← (2) ← (3)
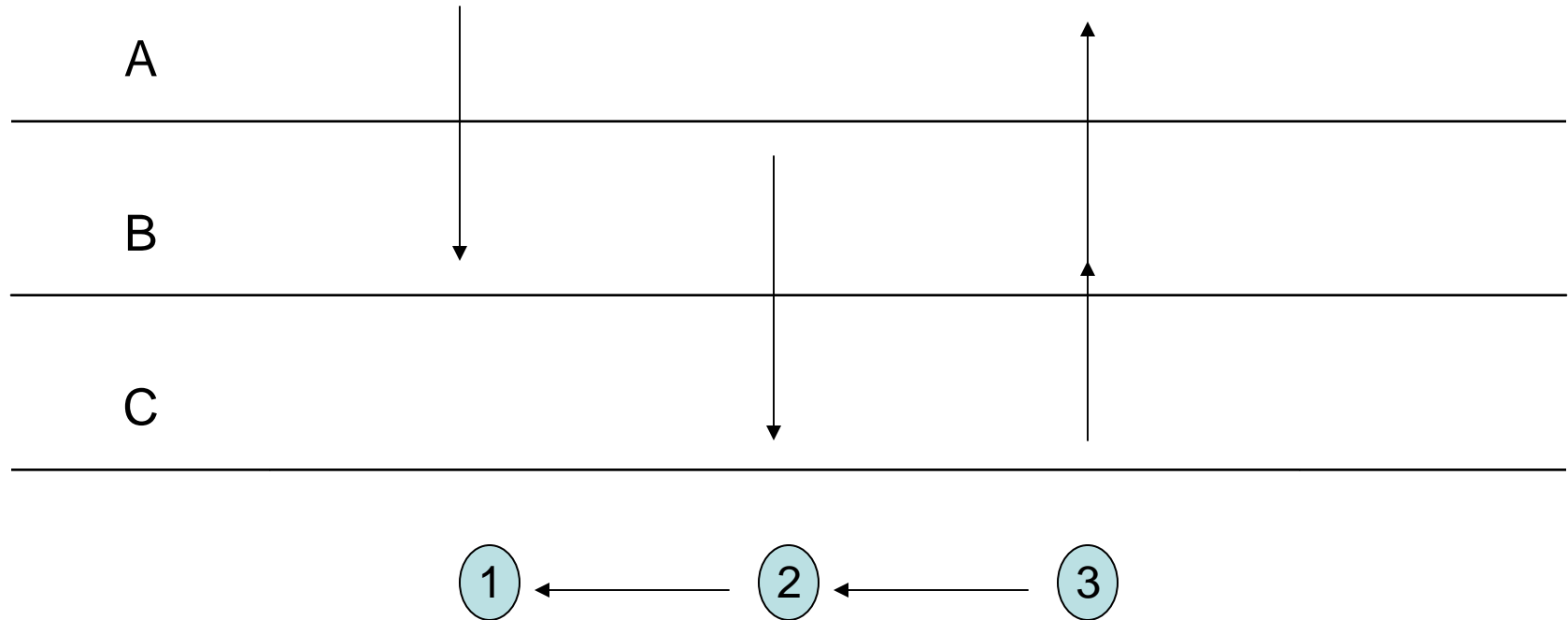
Information flows for a domestic incident

Legend - : message received "for information"

C2 for Homeland Security will benefit from information flow analyses by the MORS community

- Messages can be associated with each other through their references.
- Reference-connected sets can be constructed in real time.
- These sets uniquely identify events during a crisis.
- Operations Researchers can use the data to analyze "who talks to whom, about what, and how expeditiously" during complex incidents.
- Attributes:
    - Predetermined subject "categories" are not required
    - Information overload is automatically reduced
    - Subject categories are represented by information flows and evolve as the crisis evolves
    - Command structure can be related to the information content of messages

Backup

Remarks by Adm. Mike Mullen
14 June 2006

"And there perhaps is no greater influence than the stability we can provide when disaster strikes….It is just one example of how naval forces can be enormously influential at changing hearts and minds – and how these are exactly the types of missions our new Maritime Strategy must include."

Characteristics of Information Sharing During Crises

- Natural language communication
  - Telephone
  - E-mail
- Addressees are members of a community
  - Families
  - Friends
  - Office mates
  - Structured collaboration (e.g. military chain-of-command)
- Information evolves and expands and does not necessarily fall into pre-established "categories"
- Paths from one information source to another
- Time constraints often preclude data base searches

Automated Classification of a Reference-Connected Set